

## COMPARATIVE ANALYSIS OF THE DEVELOPMENT OF WIND ENERGY IN ISRAEL, POLAND AND UKRAINE<sup>1</sup>

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The world's energy problems contribute continuously to searching, developing and implementing new types of energy sources. Moreover the scientists predict that in the future, traditional energy sources, like coal or crude oil, will run out. That's why, it is necessary to find and develop new sources of energy. It is compatible with the theory of sustainable development, which says, that we have to allow the next generations living and environmental conditions at least such as, we have received.

One of the ways to solve this problem is to develop renewable energy sources, such as: solar, water, wind, biogas etc. The developing countries are continuously increasing the share of the renewable energy in the total energy consumption.

For example, UK energy suppliers have a target of having 15.4% of their energy coming from renewable sources by 2016. The leaders of renewable energy usage in Europe are Germany, Denmark and Sweden. In these countries, the level of renewable energy sources development is very high. Aiming towards development, it is good to have as examples the best possible technological solutions and draw upon the knowledge of more experienced countries [1].

By analytically comparing the structure of electricity production from renewable sources in Israel, Poland and Ukraine we can conclude that in Israel the electricity from renewable sources is mostly produced from solar energy (86 %) and bioenergy (9.2 %). In Poland it is solid biomass (91 %) and wind energy (6 %). In Ukraine it is hydropower (36.9 %) and bioenergy (59.8 %). The consolidate data of the primary production of renewable energy in Israel, Poland and Ukraine in the year 2013, are shown in table 1.

It should be noted, that one of the important sectors of renewable energy in the world is the production and use of wind energy. The leaders of production of wind energy can rightly be considered the European countries in general, and Denmark in particular. Moreover, according to the global trends in the renewable energy investment, the wind energy sector received more than \$ 80 billion investments in 2013. It is the second place, after the solar energy sector – \$ 113,7 billion [3].

As shown in table 1, in Israel and Ukraine the share of wind energy in the primary production of the renewable energy is insignificant. The share of wind energy in in Poland consists of 6,01 %, in Ukraine – 2.3 %, in Israel – less than 1 %.

Along with this the Governments of Poland and Ukraine have declared the intention to investigate and develop wind energy. Thus Ukraine has the a climate with good conditions for wind energy. According to the National Academy of Sciences of

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Ukraine, the wind energy potential is estimated at 30 TWh a year and total wind energy capacity could reach 16 GW by 2030. More than 7000 km<sup>2</sup> of land area is ideally suited for wind farm development. The experts have evaluated the national wind power capacity exceeding 3000–4000 MW as possible by the end of 2020. According to NEC “Ukrenergo” and OJSC “Krymenergo” today’s technical condition of power transmission lines of Ukrainian Integrated Power System can at most off-take 7.000 MW of new wind energy capacities, including 2.000 MW in the Autonomous Republic of Crimea [2; 10; 11]. The results of analyzes show that one of the main barriers to the fast development of wind energy in Ukraine are the technical condition of existing power transmission lines and the political situation.

Table 1 – The primary production of renewable energy in Israel, Poland and Ukraine 2013 year (thousand tons of oil equivalent) \*

Energy	Israel	Poland	Ukraine
Wind energy	0,60	519,20	72,80
Solar energy	60,90	17,02	31,20
Hydro power	2,80	212,80	1 187,0
Bioenergy	6,50	7 754,40	1 923,0
Geothermal	–	17,02	–

\* Formed by the authors on the basis of the literature sources [2; 4–6; 8]

Poland's' experience shows that every year they are going to increase their capacity by 550 MW. From 2020 onwards, Poland will have to develop offshore wind farms. The Polish government's current target is to produce 13GW of wind power per annum by 2030, increasing to 21GW by 2050 [7; 8].

Israel has set a target of 800 MW of large wind turbines for 2020 at a FIT of 0.53NIS (US\$0.151), which has reduced to 0.49 NIS (US\$0.14) from 2014. It is important to emphasize that the wind and solar energy are competing for the government's quotas. It is important to note that Israel is considered one of the most important migratory routes of birds from Africa to Eurasia and back. Besides, Israel has a huge variety of local birds and more than 30 species of bats. The wind turbines may be highly dangerous for these birds. That is why the development of wind energy has been inhibited by local nature preservation agencies [12].

The comparative analysis of the conditions for developing the wind sector in Israel, Poland and Ukraine shows that there are a lot of barriers to investing in the wind energy sector. First of all the wind energy sector needs to be supported by government and private business. These sectors should understand that the fields of wind energy can create a combined positive effect, for energy and for other environmental, economic and social aspects.

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